

What is the relationship between eating out and adiposity in children?

Conclusion

Strong and consistent evidence indicates that children and adults who eat fast food are at increased risk of weight gain, overweight and obesity. The strongest documented relationship between fast food and obesity is when one or more fast food meals are consumed per week. There is not enough evidence at this time to similarly evaluate eating out at other types of restaurants and risk of weight gain, overweight and obesity.

Grade: Strong

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades, [click here](#).

Evidence Summary Overview

The literature review identified six studies: One systematic review (Rosenheck, 2008) and five cohort studies (Bisset, 2007; Haines, 2007; Niemeier, 2006; Taveras, 2005; Thompson, 2004). The studies were conducted in the US and Canada. Studies ranged in sample size from 101 (Thompson, 2004) to 14,355 (Taveras, 2005) and one study included only girls (Thompson, 2004). All six studies looked specifically at fast food consumption. Five studies with strong methodology found a positive relationship between consumption of fast food and body weight in children (Rosenheck, 2008; Bisset, 2007; Niemeier, 2006; Taveras, 2005; Thompson, 2004). Two studies demonstrated the greatest gains in body weight were seen with fast food consumption greater than once a week (Taveras, 2005; Thompson, 2004). One study found a negative relationship between consumption of fast food and body weight in girls and no relationship in boys (Haines, 2007).

Evidence summary paragraphs:

Systematic Reviews (1)

Rosenheck R, 2008 (positive quality) conducted a systematic review to examine the association between fast food consumption, weight gain and obesity. A MEDLINE search was conducted and included studies that were published through February 2008, were cross-sectional, prospective cohort and experimental studies, used human subjects and were published in English. The final sample included 16 studies (six cross-sectional, seven prospective cohort, three experimental studies). Findings from cross-sectional studies suggest discrepant associations between fast food frequency and overweight or obesity in terms of body mass index (BMI). Six of the seven prospective cohort studies found a positive association between more frequent fast food consumption and an increase in BMI. Only one experimental study evaluated weight status and increased fast food consumption, finding a positive association between fast food frequency and weight gain. The author concluded that sufficient evidence exists to suggest that fast food consumption is associated with weight gain.

Cohort Studies (5)

Bisset S et al, 2007 (positive quality) conducted a cohort study in Canada to examine how changes in dietary behaviors during the transition from childhood to adolescence are associated with occurrence of overweight and obesity in mid-adolescence. Data were collected at baseline in grade four, grade six, grade seven and grade nine. Body mass index was calculated using self-reported height and weight when participants were in grade nine. Eating behavior was measured with a self-administered food frequency questionnaire (FFQ) at each data collection point. The final sample included 1,188 participants who provided data on at least one occasion (627 boys, 561 girls; in grade nine, 12.4% were overweight and 7.3% were obese). Obese students in grade nine reported a higher consumption of fast food at baseline in grade four [0.77 (0.33); $P < 0.05$]. The authors concluded that obesity was associated with fast food consumption during the transition from childhood to adolescence.

Haines J et al, 2007 (positive quality) used prospective cohort data from the United States to examine factors associated with weight status of adolescents, including frequency of breakfast consumption. Subjects were from the Project Eating Among Teens (EAT) study, who were recruited in 1998 to 1999 and followed up five years later (2003 to 2004). Body mass index was determined using self-reported height and weight at baseline and five-year follow-up. Dietary intake data were collected at baseline and year five using an FFQ, which included a question regarding the number of days over the past week fast food was consumed. The final sample included 2,516 subjects (1,386 girls, 1,130 boys). In girls, fast food consumption at baseline was negatively associated with overweight at year five (OR=0.88, 95% CI: 0.79, 0.98; $P < 0.05$). In boys, fast food consumption was not associated with weight change. The authors concluded that girls who consumed more fast food at baseline were less likely to be overweight after five years of follow-up.


Niemeier HM et al, 2006 (positive quality) analyzed data from a prospective cohort study in the United States to examine the relationship between fast food consumption during adolescence and BMI status in early adulthood. Data from Wave II (1996) and Wave III (2001 to 2002) of the National Longitudinal Study of Adolescent Health was used. Height and weight were measured at both Waves and used to calculate BMI and BMI Z-scores. Frequency of fast food consumption (number of days over the last week) was measured at both waves using a questionnaire. The final sample included 9,919 subjects (age 16 years at Wave II, age 21 years at Wave III; Wave II BMI = 23 kg/m^2). Increased fast food consumption at Wave II predicted significantly higher BMI Z-scores at Wave III ($P < 0.05$). Change in fast food consumption between Wave II and III did not significantly predict BMI Z-score at Wave III. The authors concluded that greater fast food consumption during adolescence is associated with increased weight gain during the transition from adolescence to adulthood.




Taveras EM et al, 2005 (positive quality) used data from a prospective cohort study in the United States to examine the cross-sectional and longitudinal associations between consumption of fried foods away from home (FFA) and BMI. Children in this study were part of the Growing Up Today Study, which included children who are offspring of Nurses' Health Study II participants. Data were collected by an annual mailed self-administered questionnaire in 1996, 1997, 1998 and 1999. Children self-reported their height and weight each year, and BMI was computed. Intake of FFA was determined using a question that asked, "How often do you eat fried food away from home (e.g., French fries, chicken nuggets)?" The final sample included 14,355 children (ages nine to 14 at baseline). Body mass index was found to be greater across increasing categories of FFA in boys only ($P < 0.02$). Children who increased their consumption of FFA from "never or less than once a week" to "four to seven times a week" gained 0.2 kg/m^2 . Boys who decreased their consumption of FFA from "four to seven times a week" to "never or less than once a week" decreased their BMI [-0.31 (-0.62 to 0.00)]; however, girls who decreased their consumption of FFA from "four to seven times a week" to "never or less than once a week" gained weight [0.27 (-0.02 to 0.56)]. The authors



concluded that children who consume greater quantities of FFA are heavier, and increasing consumption of FFA over time may lead to excess weight gain.

Thompson OM et al, 2004 (positive quality) analyzed data from a prospective cohort study in the United States to assess the relationship between consuming food away from home and change in BMI Z-score. Subjects provided seven-day food records at baseline and follow-up (median follow-up was nine years, ranging from two to 10 years). BMI Z-scores were calculated based on measured height and weight. The final sample included 101 girls (median age at baseline = nine years, and median BMI at baseline = 16.4kg/m²; median age at follow-up = 15 years, and median BMI at follow-up = 20.3kg/m²). Weekly frequency of consuming quick-service food at baseline was positively associated with change in BMI Z-score (F=6.49, P<0.01), but the frequency of eating in coffee shops and restaurants at baseline was not. Participants who ate quick-service food twice a week or more at baseline had the greatest mean change in BMI Z-score at follow-up, and this change was significantly different from that seen in girls who ate quick-service food once a week or not at all (P<0.05). The authors concluded that adolescent girls who eat quick-service food twice a week or more are likely to increase their BMI over time.

 [View table in new window](#)

Author, Year, Study Design, Class, Rating	Participants	Methods: Diet Assessment, Adiposity Measurement	Outcomes
Bisset et al 2007 Study Design: Prospective cohort study Class: B Rating: 	N=1,188 (627 boys, 561 girls). Age: Grade nine. 12.4% were overweight; 7.3% were obese. Location: Canada.	Data were collected at baseline in grade four, grade six, grade seven and grade nine. BMI was calculated using self-reported height and weight when participants were in grade nine. Eating behavior was measured with a self-administered FFQ at each data collection point.	Obese students in grade nine reported a higher consumption of fast food at baseline in grade four [0.77 (0.33); P<0.05].
Haines et al 2007 Study Design: Prospective Cohort Study Class: B	N=2,516 subjects (1,386 girls, 1,130 boys). Location: United States.	Subjects were from the Project Eating Among Teens (EAT) study, who were recruited in 1998 to 1999 and followed up five years later (2003 to 2004). BMI was determined using self-reported height and	In girls, fast food consumption at baseline was negatively associated with overweight at year five (OR=0.88, 95% CI: 0.79, 0.98; P<0.05). In boys, fast food consumption was not associated with weight Δ.

<p>Rating: </p>		<p>weight at baseline and five-year follow-up.</p> <p>Dietary intake data was collected at baseline and year five using a FFQ, which included a question regarding the number of days over the past week fast food was consumed.</p>	
<p>Niemeier et al 2006</p> <p>Study Design: Prospective cohort study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=9,919 subjects.</p> <p>Age: 16 years at Wave II; 21 years at Wave III.</p> <p>Wave II BMI = 23kg/m².</p> <p>Location: United States.</p>	<p>Data from Wave II (1996) and Wave III (2001 to 2002) of the National Longitudinal Study of Adolescent Health were used.</p> <p>Height and weight were measured at both Waves and used to calculate BMI and BMI Z-scores.</p> <p>Frequency of fast food consumption (number of days over the last week) was measured at both waves using a questionnaire.</p>	<p>↑ fast food consumption at Wave II predicted significantly higher BMI Z-scores at Wave III (P<0.05).</p> <p>Δ in fast food consumption between Wave II and III did not significantly predict BMI Z-score at Wave III.</p>
<p>Rosenheck R, 2008</p> <p>Study Design: Meta-analysis or Systematic Review</p> <p>Class: M</p> <p>Rating: </p>	<p>N=16 studies (six cross-sectional, seven prospective cohort, three experimental studies).</p>	<p>A MEDLINE search was conducted and included studies that were published through February 2008, were cross-sectional, prospective cohort and experimental studies, used human subjects and were published in English.</p>	<p>Findings from cross-sectional studies suggest discrepant associations between fast food frequency and overweight or obesity in terms of BMI.</p> <p>Six of the seven prospective cohort studies found a positive association between more frequent fast food consumption and an ↑ in BMI.</p> <p>Only one experimental study evaluated weight status and ↑ fast food consumption, finding a</p>


			positive association between fast food frequency and weight gain.
<p>Taveras EM, Berkey CS et al, 2005</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=14,355 children.</p> <p>Age: Nine to 14 at baseline.</p> <p>Location: United States.</p>	<p>Children in this study were part of the Growing Up Today Study, which included children who are offspring of Nurses' Health Study II participants.</p> <p>Data were collected by an annual mailed self-administered questionnaire in 1996, 1997, 1998 and 1999.</p> <p>Children self-reported their height and weight each year and BMI was computed.</p> <p>Intake of fried foods away from home (FFA) was determined using a question that asked, "How often do you eat FFA (e.g., French fries, chicken nuggets)?"</p>	<p>BMI was found to be greater across increasing categories of FFA in boys only ($P<0.02$).</p> <p>Children who ↑ their consumption of FFA from "never or less than once a week" to "four to seven times a week" gained 0.21kg/m^2.</p> <p>Boys who ↓ their consumption of FFA from "four to seven a week" to "never or less than once a week" ↓ their BMI [-0.31 (-0.62 to 0.00)]; however, girls who ↓ their consumption of FFA from "four to seven times a week" to "never or less than once a week" gained weight [0.27 (-0.02 to 0.56)].</p>
<p>Thompson OM, Ballew C et al, 2004</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=101 girls.</p> <p>Median age at baseline: Nine years; Median BMI at baseline: 16.4kg/m^2.</p> <p>Median age at follow-up: 15 years; Median BMI at follow-up: 20.3kg/m^2.</p> <p>Location: United States.</p>	<p>Subjects provided seven-day food records at baseline and follow-up (median follow-up was nine years, ranging from two to 10 years).</p> <p>BMI Z-scores were calculated based on measured height and weight.</p>	<p>Weekly frequency of consuming quick-service food at baseline was positively associated with Δ in BMI Z-score ($F=6.49$, $P<0.01$), but the frequency of eating in coffee shops and restaurants at baseline was not.</p> <p>Participants who ate quick-service food twice a week or more at baseline had the greatest mean Δ in BMI Z-score</p>


			at follow-up, and this Δ was significantly different from that seen in girls who ate quick-service food once a week or not at all ($P < 0.05$).
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Research Design and Implementation Rating Summary


For a summary of the Research Design and Implementation Rating results, [click here](#).

Worksheets


 [Bisset S, Gauvin L, Potvin L, Paradis G. Association of body mass index and dietary restraint with changes in eating behaviour throughout late childhood and early adolescence: a 5-year study. *Public Health Nutrition*. 2007;10\(8\):780-789.](#)


 [Haines J, Neumark-Sztainer D, Wall M, Story M. Personal, behavioral, and environmental risk and protective factors for adolescent overweight. *Obesity \(Silver Spring\)*. 2007 Nov;15\(11\):2748-60.](#)

 [Niemeier HM, Raynor HA, Lloyd-Richardson EE, Rogers ML, Wing RR. Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *J Adolesc Health*. 2006 Dec;39\(6\):842-9. Epub 2006 Sep 27.](#)

 [Rosenheck R. Fast food consumption and increased caloric intake: A systematic review of a trajectory towards weight gain and obesity risk. *Obes Rev*. 2008 Nov; 9 \(6\): 535-547. Epub 2008 Mar 14. Review.](#)

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 [Taveras EM, Berkey CS, Rifas-Shiman SL, Ludwig DS, Rockett HR, Field AE, Colditz GA, Gillman MW. Association of consumption of fried food away from home with body mass index and diet quality in older children and adolescents. *Pediatrics*. 2005 Oct; 116 \(4\): e518-524.](#)

 [Thompson OM, Ballew C, Resnicow K, Must A, Bandini LG, Cyr H, Dietz WH. Food purchased away from home as a predictor of change in BMI z-score among girls. *Int J Obes Relat Metab Disord*. 2004 Feb; 28 \(2\): 282-289.](#)